

Figure 1: Experimental Cavity hysteresis with the packed bed

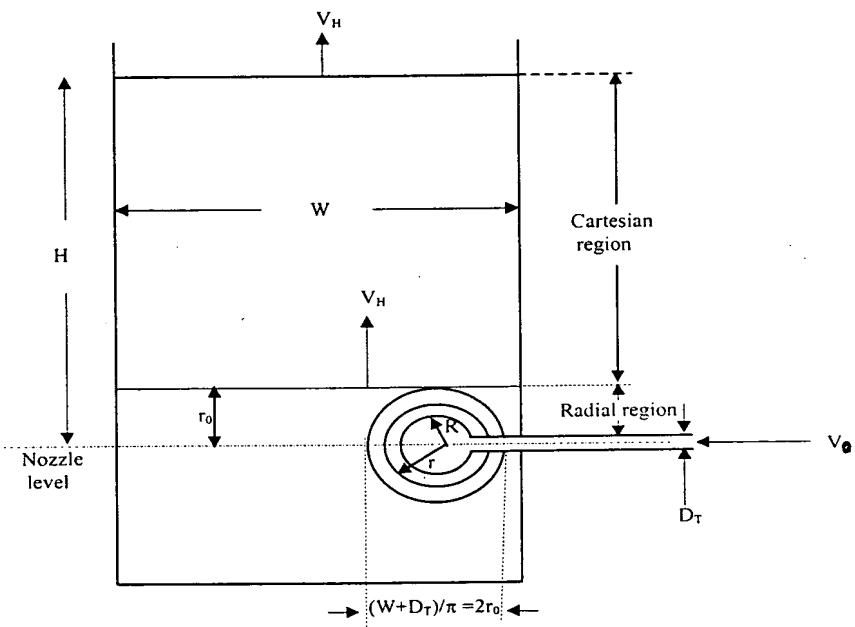


Figure 2. Packed bed showing the essential regions used for modeling.

Figure 3. Forces acting on an element in the cartesian region.

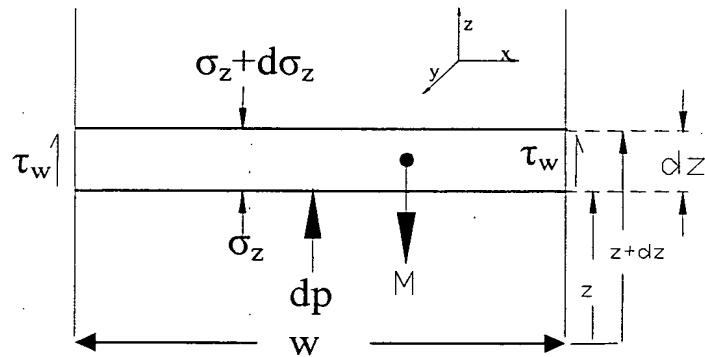
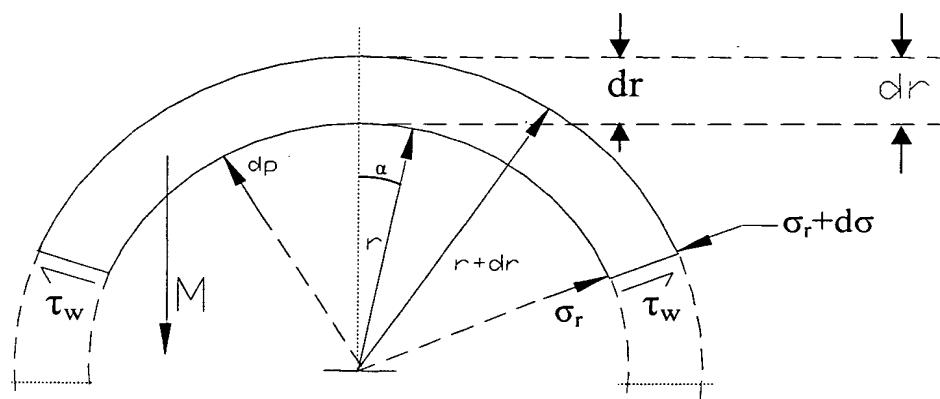


Figure 4. Forces acting on an element in the radial region.



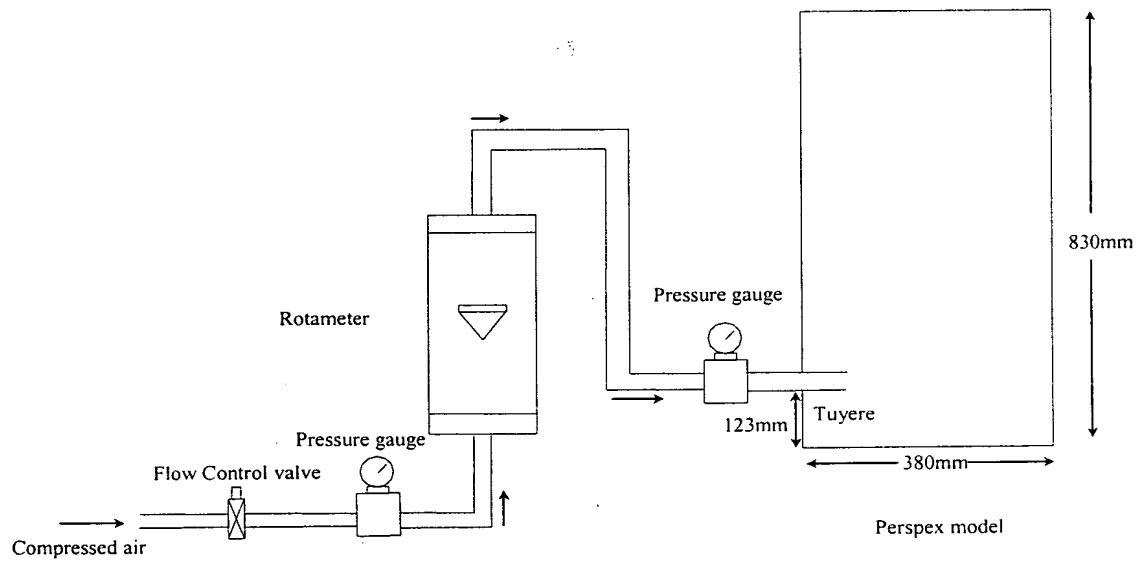


Figure 5. Schematic diagram of experimental setup

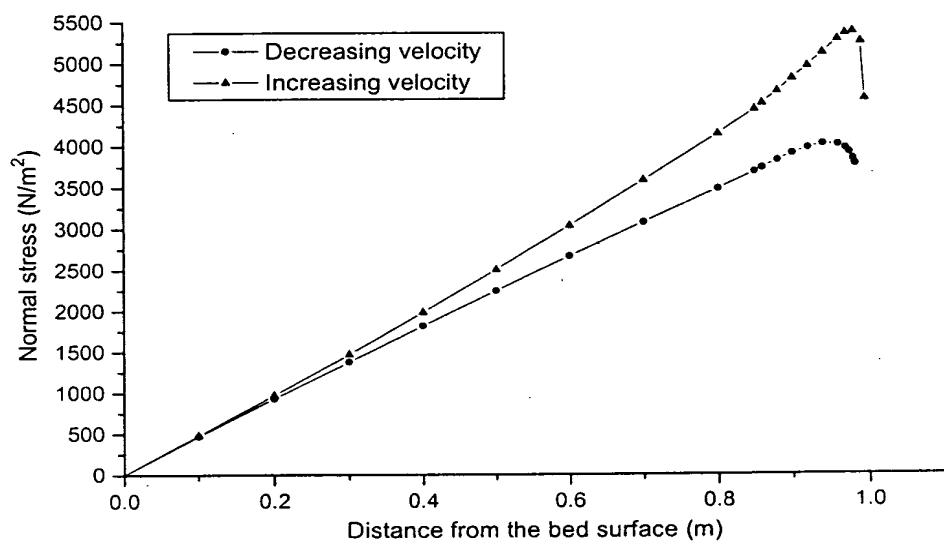


Figure 6. Hysteresis curve of normal stress at velocity = 40 m/s

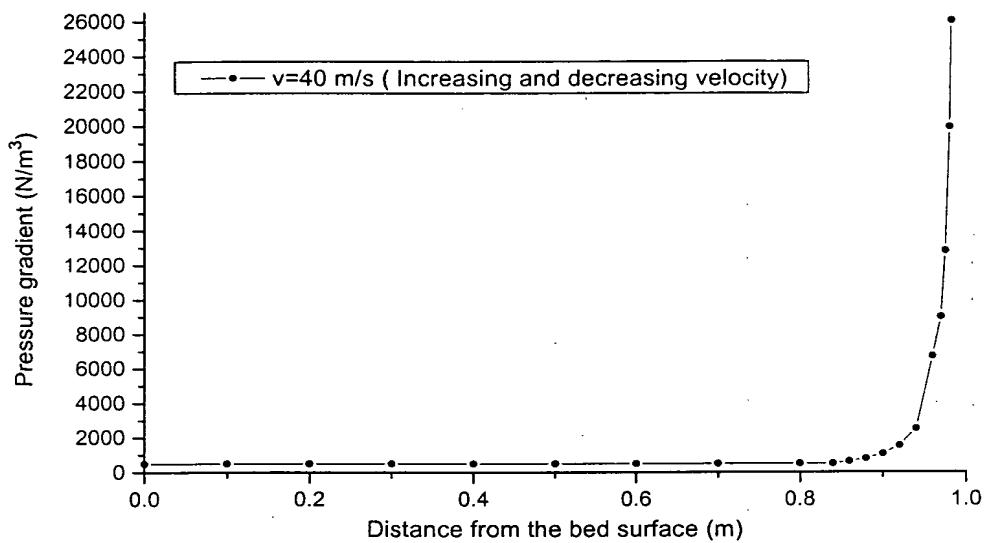


Figure 7. Variation of pressure gradient with distance from the bed surface.

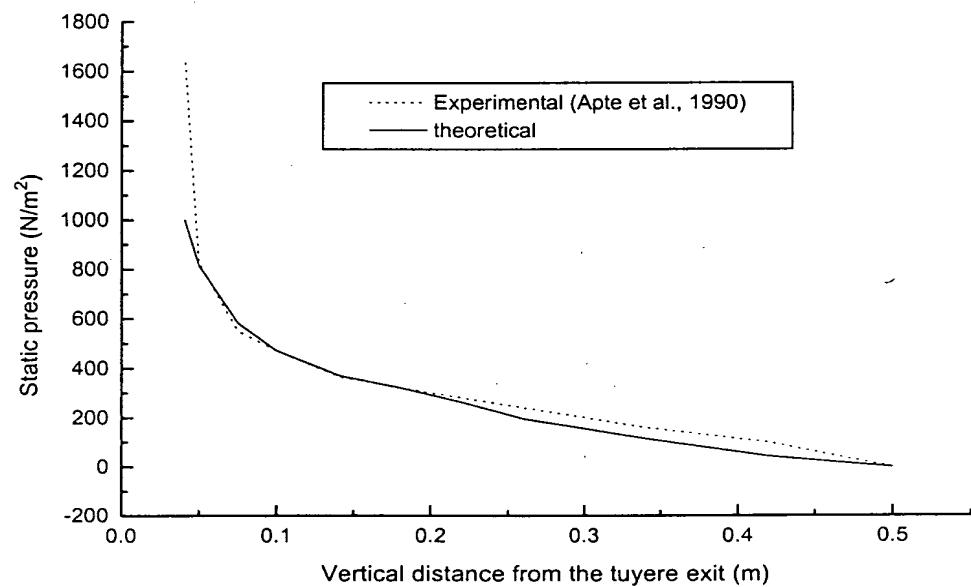


Figure 8. Comparison of static pressure with experimental data.

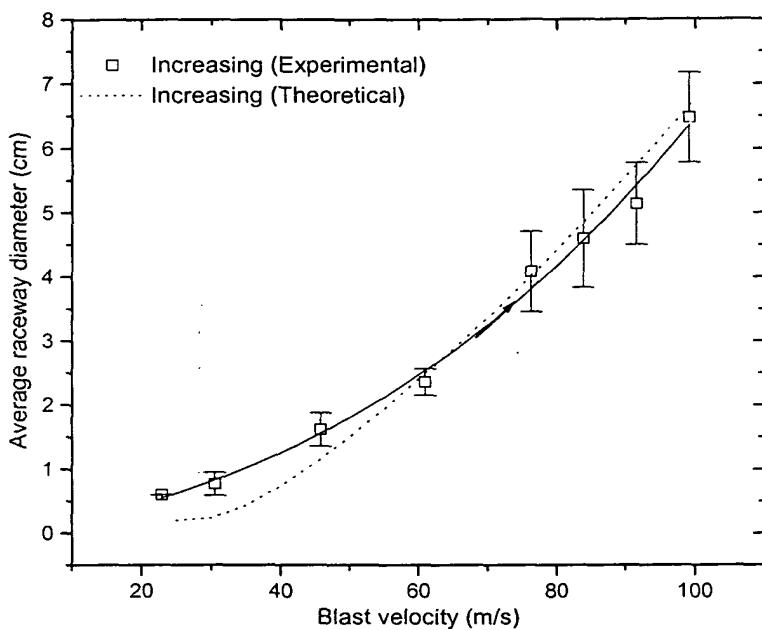


Figure 9. A comparison between theoretical and experimental cavity size for increasing velocity.

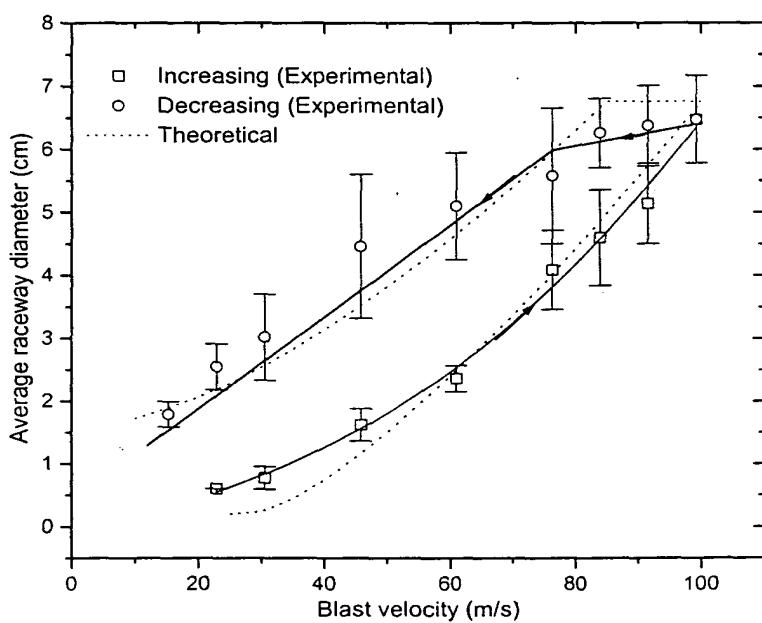


Figure 10. A comparison between theoretical and experimental cavity hysteresis.

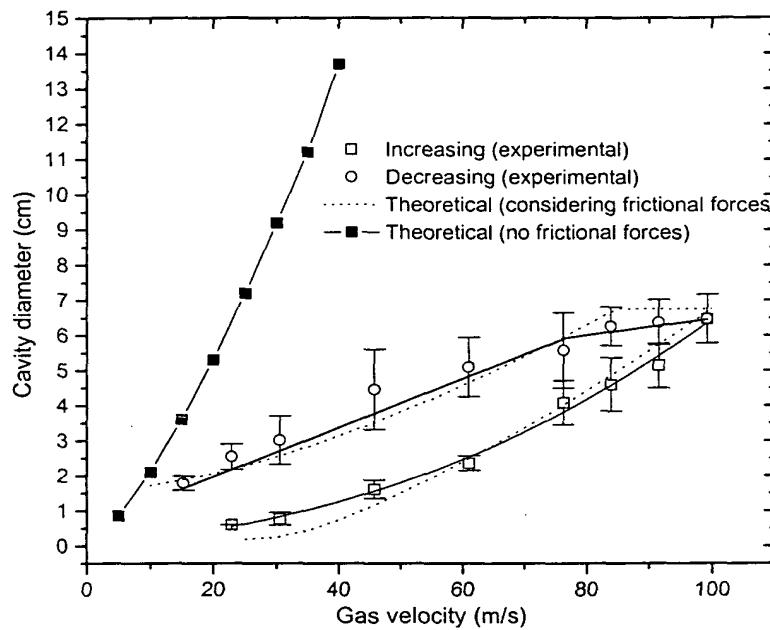


Figure 11. A comparison between theoretical cavity size considering and not considering the frictional forces.

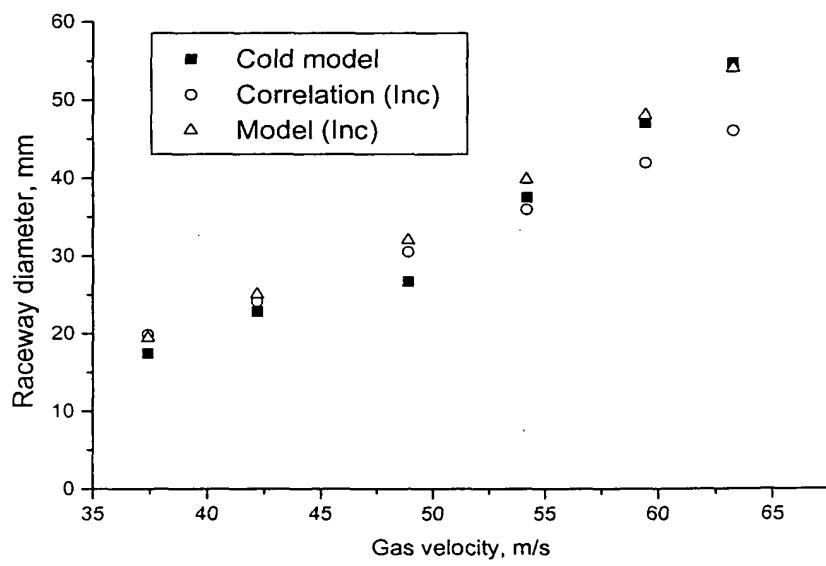


Figure 12. Comparison of correlation raceway size with published Flint and Burgess (1992) data of 3mm polystyrene.

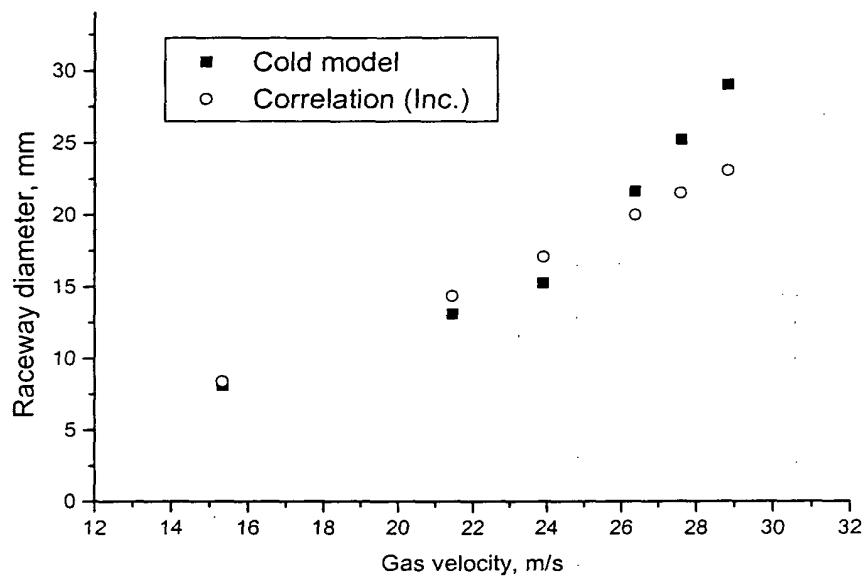


Figure 13. Comparison of correlation raceway size with published Flint and Burgess (1992) data of 0.725mm ballotini glass.

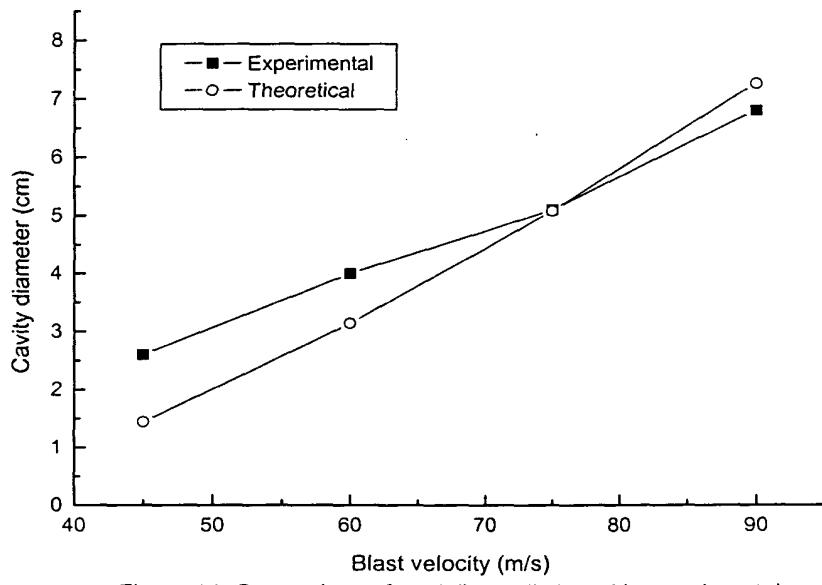


Figure 14. Comparison of model's prediction with experimental (Born, 1991) values of cavity size.

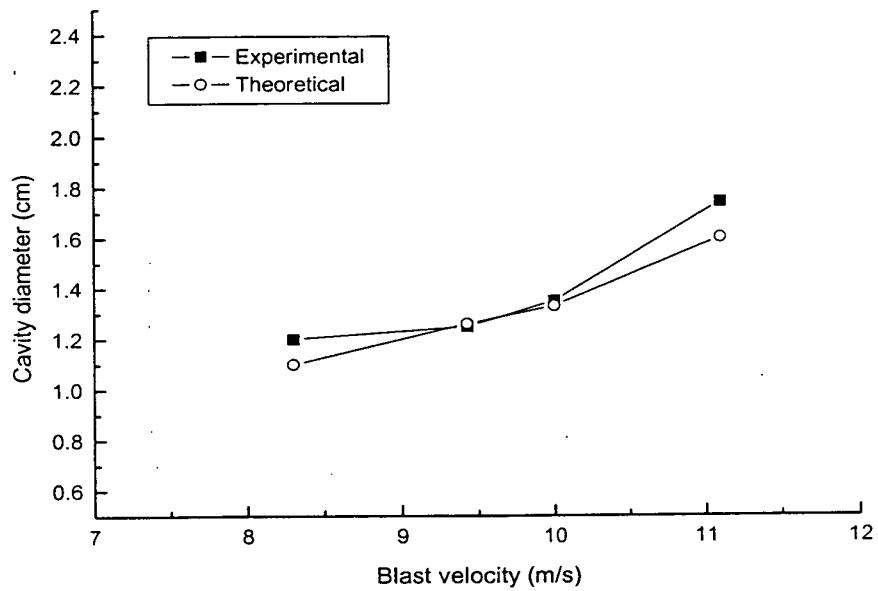


Figure 15. Comparison of experimental (Sastry, 2000) and theoretical values of cavity size.

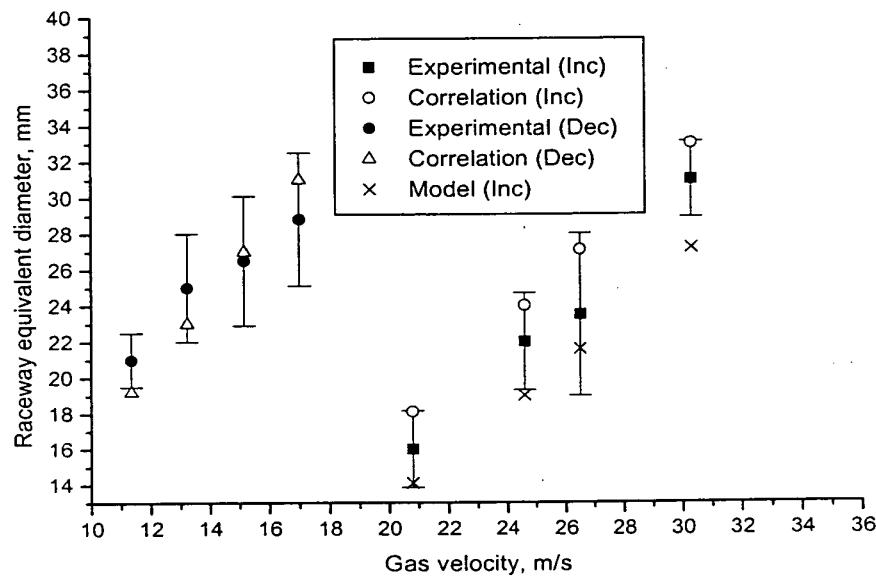


Figure 16. Comparison of raceway size between experimental and correlation in both increasing and decreasing velocity.

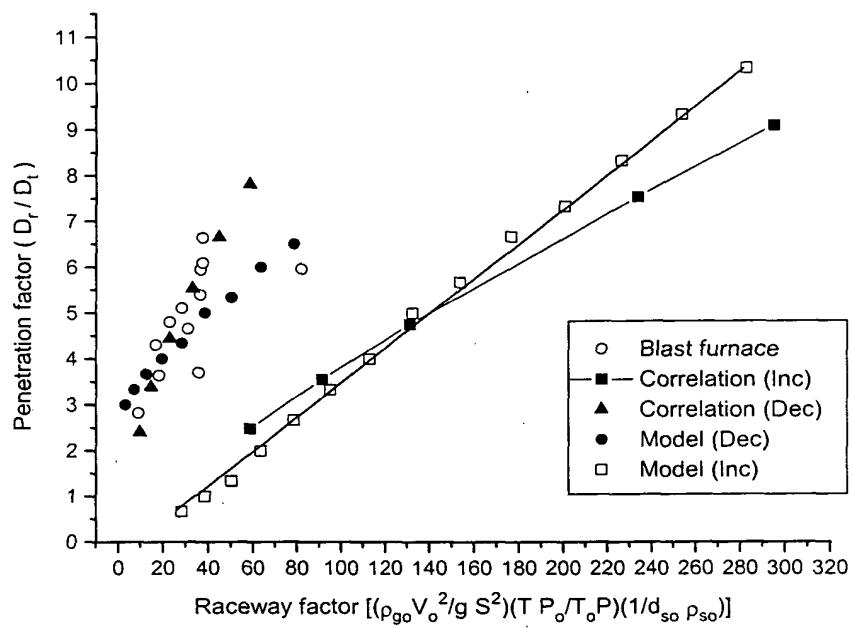


Figure 17. Comparison of blast furnace (Hatano et al., 1977) and experimental data for both increasing and decreasing velocity conditions.

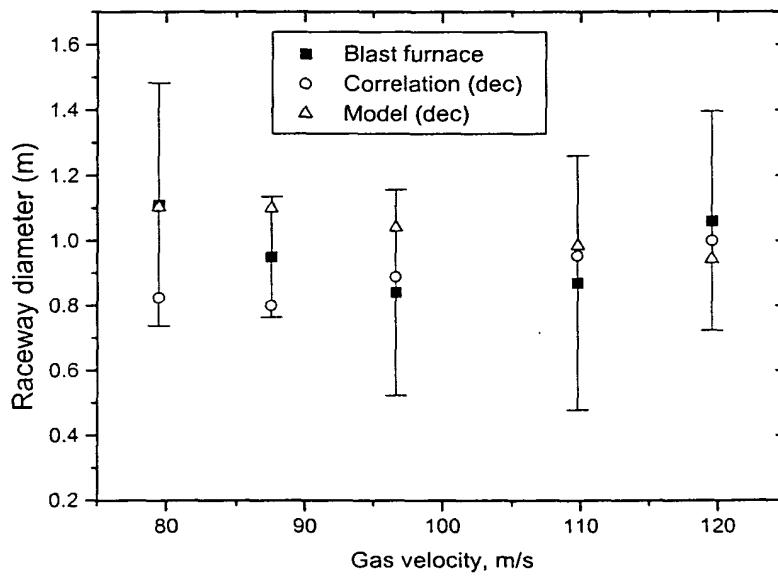


Figure 18. Comparison of correlation raceway size with published (Wgastaff, 1957) blast furnace data.

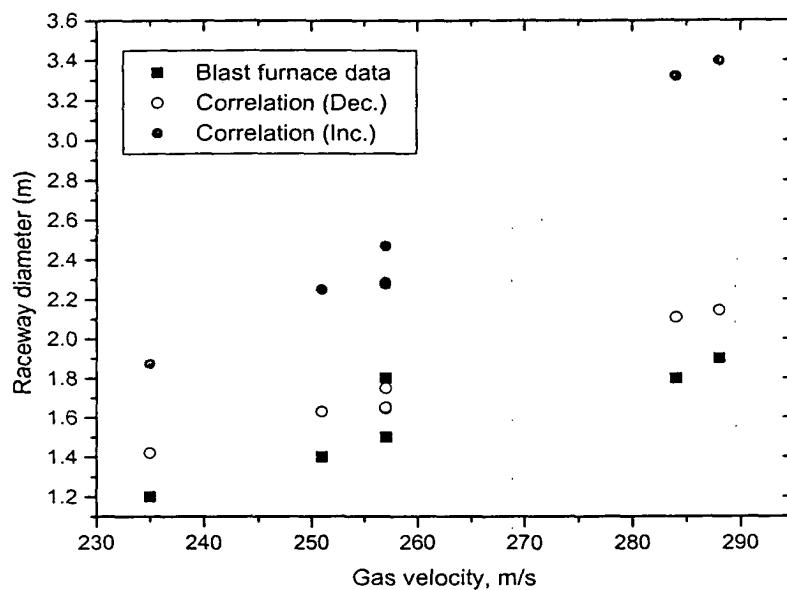


Figure 19. Comparison of correlation raceway size with published blast furnace data of Nishi et al., 1982.

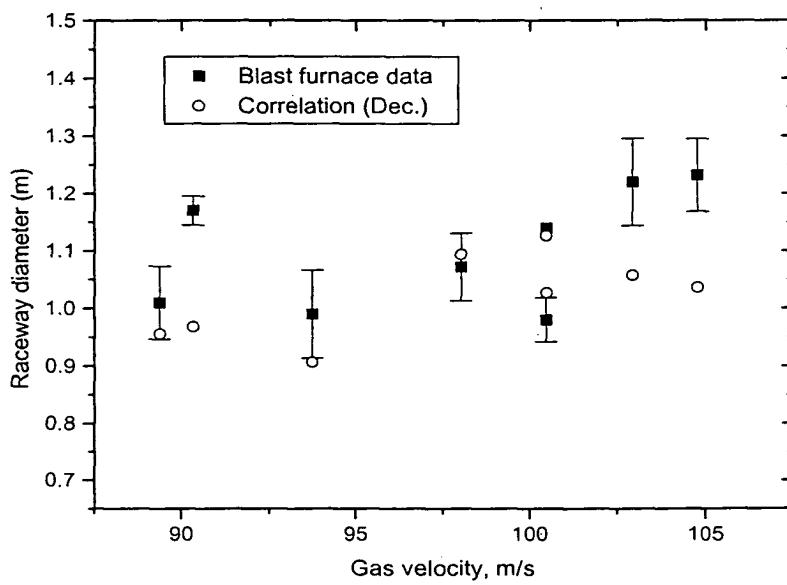
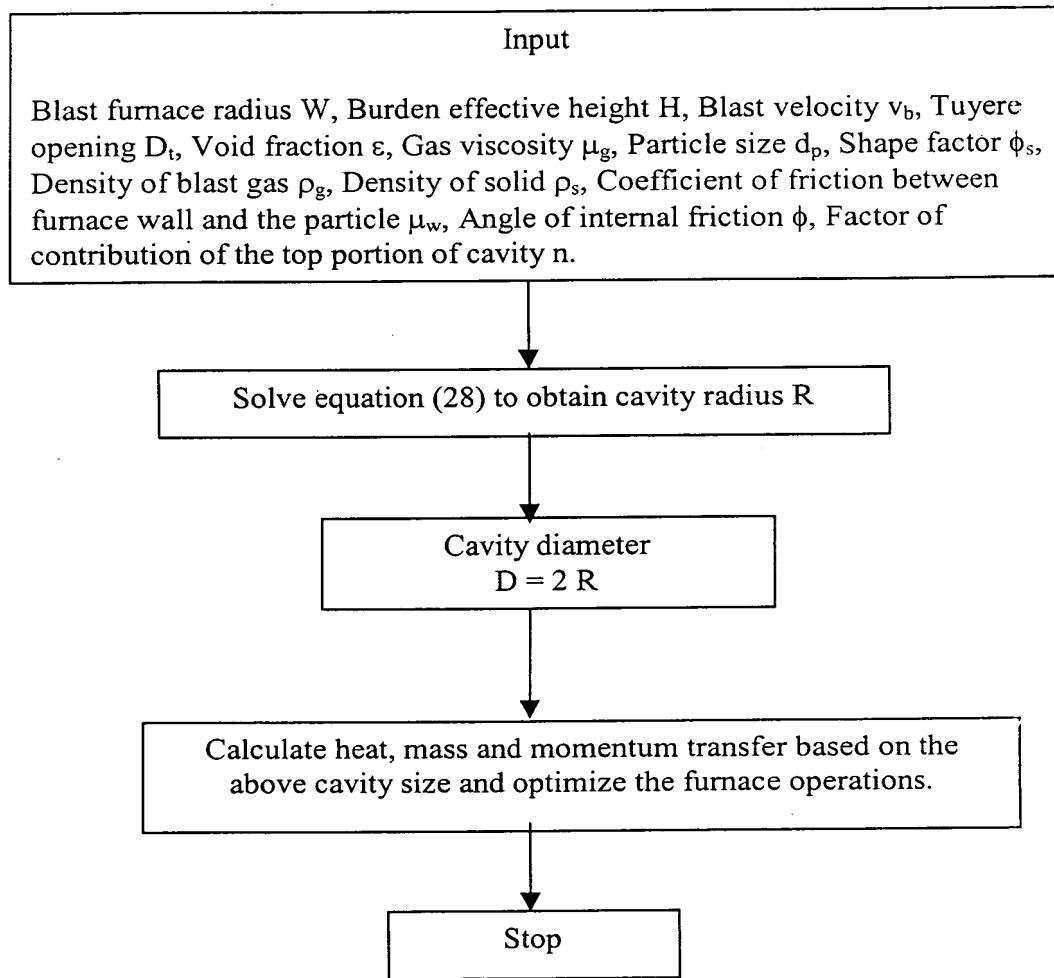


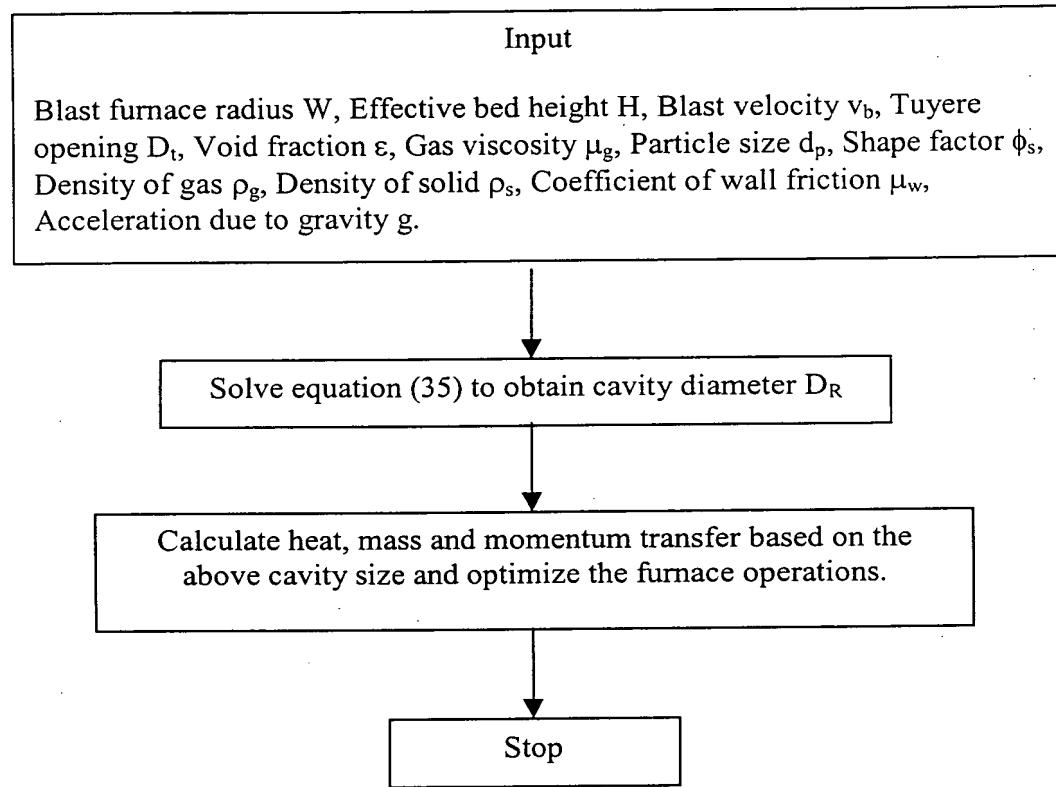
Figure 20. Comparison of correlation raceway size with published blast furnace data of Poveromo et al., 1975.

**Figure 21: Determination of Cavity/Raceway Size in packed bed like Ironmaking & Lead Blast furnaces, Corex, Cupola, etc. for decreasing gas velocity Based on Mathematical Model**



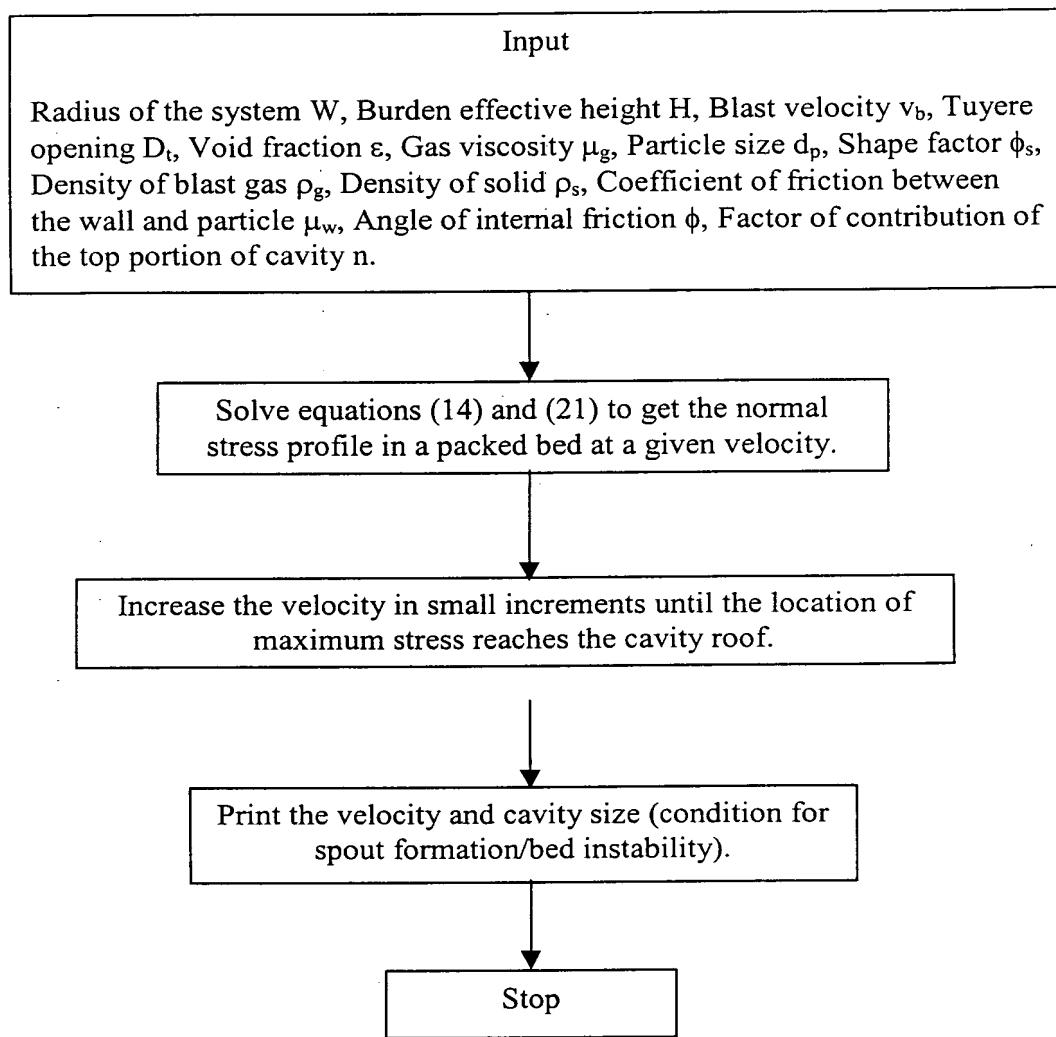
All units are in SI.

**Figure 22: Determination of Cavity/Raceway Size in packed bed like Ironmaking & Lead Blast furnaces, Corex, Cupola, etc. for decreasing gas velocity Based on Decreasing Correlation**



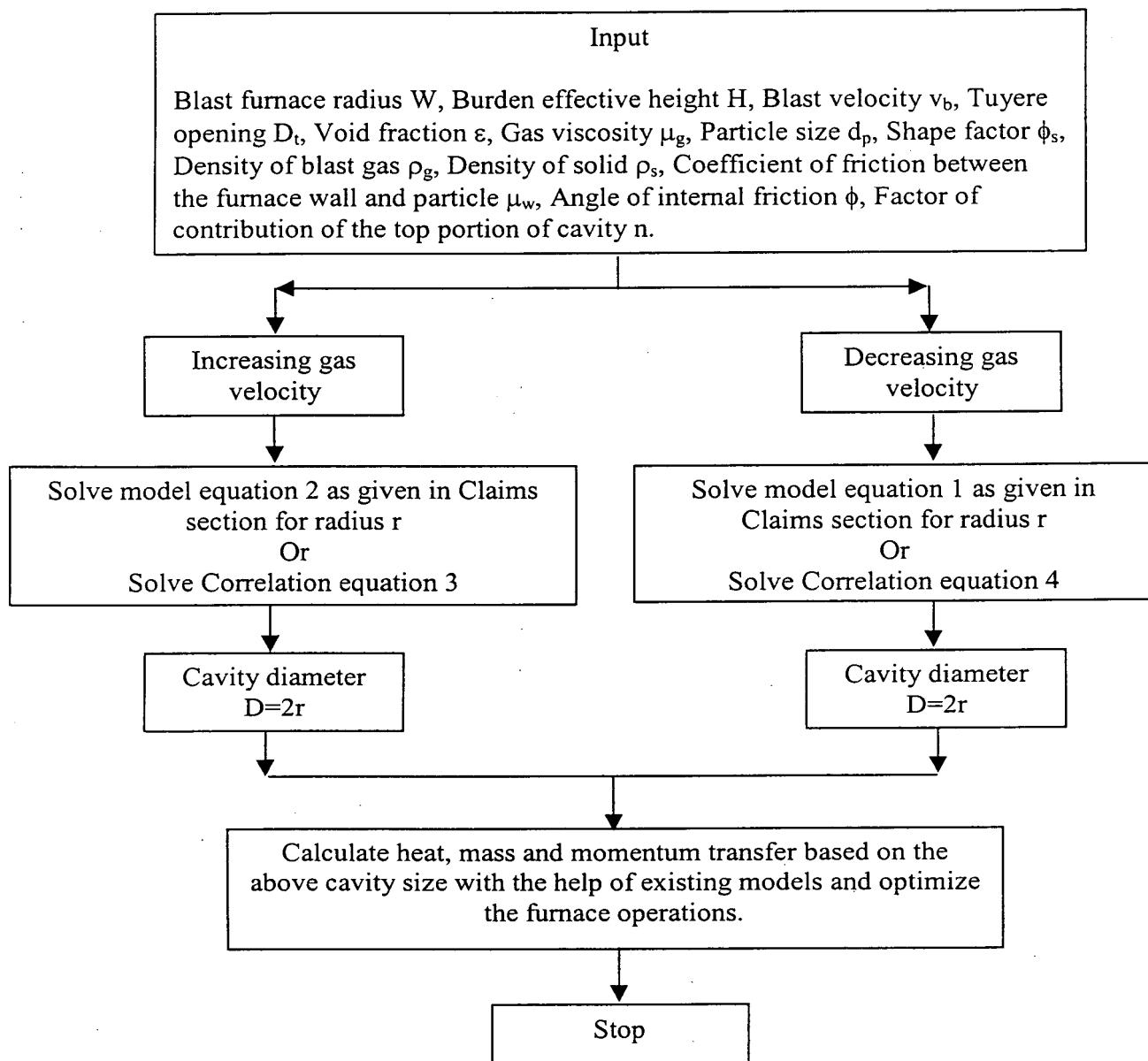
All units are in SI.

**Figure 23: Determination of Maximum Velocity/Cavity Size in a Spouted Bed Above Which Spout Will Form / Or Condition of Instability In Packed Bed Based on Mathematical Model**



All units are in SI.

**Figure 24: Flow chart for determining cavity/raceway size in packed bed like ironmaking & lead blast furnaces, corex, cupola, etc.**



All units are in SI.